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Sonographic detection of splenomegaly in acute hepatitis patients without portal hypertension

Original Article

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ARTICLE INFORMATION

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ABSTRACT

Background: This descriptive cross-sectional study utilized ultrasound scanning as a diagnostic tool to assess abdominal conditions among a selected population. Ultrasound is a non-invasive imaging way of examine patients that uses high-frequency acoustic waves to produce real-time images of internal organs, without the use of ionizing radiation. In this study, a transabdominal ultrasound procedure was employed to examine the abdominal organs, with a particular focus on identifying cases of splenomegaly. Splenomegaly, defined as the abnormal enlargement of the spleen, was documented based on sonographic criteria. The study was subjected to describe the prevalence and potential causes of splenomegaly within the population, including associations with conditions such as hepatitis, hepatomegaly, and various infectious diseases. Data were collected at a single point in time to determine the frequency and distribution of splenomegaly among the study participants.

Objective: To ascertain the splenomegaly sonographic assessment in cases of acute hepatitis in absence of portal hypertension.

Study Design: Descriptive cross-sectional study.

Methodology: Sonographic assessment of splenomegaly in acute hepatitis in absence of hypertension to the portal vein was the subject of a descriptive cross-sectional study at Superior University Lahore from May 2024 to February 2025. The non-probability sample approach was employed in this work. We included 133 hepatitis patients without hypertension at the portal vein and with an enlarged spleen.

Results: In this descriptive cross-sectional study involving 133 patients diagnosed with acute hepatitis without portal hypertension, splenomegaly was identified in 102 patients (77%), while 31 patients (23%) had a normal spleen on ultrasound. These findings suggest that splenomegaly is a common sonographic feature among patients with acute hepatitis and may serve as a significant indicator in its assessment. Among the patients, hepatitis C was the most prevalent type, observed in 63 patients (47%), followed by hepatitis B and D in 53 patients (40%), and hepatitis A in 17 patients (13%). The distribution of splenomegaly varied by hepatitis type: 62 patients (46.6%) with hepatitis C, 36 patients (27%) with hepatitis B, and only 4 patients (3%) with hepatitis A and D showed splenic enlargement. These results highlight a notable association between splenomegaly and acute hepatitis, particularly in hepatitis C and B cases, as detected through ultrasound imaging.

Conclusions: This descriptive cross-sectional study emphasizes the importance of evaluating splenic size via ultrasound in patients with acute hepatitis in the absence of portal hypertension. Splenomegaly was observed as a frequent finding among individuals with liver-related conditions, supporting its relevance in the clinical assessment of hepatic disease. The results underscore the value of incorporating spleen size measurement as a routine component of abdominal ultrasonography in cases of acute hepatitis. These findings reinforce the role of non-invasive imaging in monitoring disease progression and suggest that splenomegaly, in this context, is more likely a reactive change associated with acute hepatic inflammation rather than an indication of chronic liver pathology or portal hypertension.

Introduction:

The spleen is the body's largest lymphoid organ. It is located deep in the left hypochondrium, between the gastric fundus, left hemidiaphragm, and the left kidney. Splenectomy may be required for trauma, lymphoid neoplasia, stomach cancer, portal hypertension, or idiopathic thrombocytopenia[1]. The gastrosplenic ligament connects the spleen to the stomach, whereas the splenorenal (or ileorenal) ligament connects it to the left kidney[2].

The term "splenomegaly" refers to the pathological enlargement of the spleen beyond its normal anatomical and volumetric parameters. An enlarged spleen is frequently seen on imaging tests. The underlying cause of a patient's symptoms or clinical presentation may be associated with splenomegaly, or it may be an unexpected imaging result based on a known clinical condition[3].Typically, the spleen exceeds 12 cm in craniocaudal length and 5–6 cm in anteroposterior and longitudinal splenic length. In adults, this is more prominent than 13 cm, though the exact limits may

vary based on age, sex, and body habitus. A strong immune response is triggered by viral hepatitis, which causes the spleen's lymphoid tissue to become activated and proliferate. The spleen is similar to two distinct organs joined in both form and function. Although it is an organ of the immune system, the white pulp plays a role in the development of antibodies as well as the maturation of plasma cells and lymphocytes. On the other hand, the red pulp plays a phagocytic role, helping to eliminate senescent red blood cells and extracting particles from the blood. In the early stages of life, the red pulp also contributes to haematopoiesis and blood sequestration and storage[4]. The spleen's length varies, although it averages 11 cm[5].

The weight ranges from 50 to 300 g, with an average of 150. The normal adult spleen shrinks with age[6]. Splenomegaly can also occur in malignancies of the hematopoietic system and in conditions associated with portal hypertension[7]. The possible relationships between splenomegaly and portal hypertension have been analysed in patients with cirrhosis. In this condition, splenomegaly is not only caused by portal congestion, but it is mainly due to tissue hyperplasia and fibrosis. The increase in spleen size is followed by an increase in splenic blood flow, which participates in portal hypertension actively congesting the portal system[8].

On ultrasound (US), the parenchyma appears highly homogenous and uniform, with an echogenicity somewhat higher than normal hepatic parenchyma. Splenic size eventually increased as a result of the immune response being activated in acute hepatitis. The evaluation of unpalpable spleens is now feasible because to recent developments in ultrasonography[9]. Many reports have shown the size of resected spleens and the size of the spleen measured by ultrasonography correspond well[10,11]. It suggested that ultrasound is a reliable and accurate method of measuring spleen size[12,13].

Although it seldom causes symptoms, it can lead to hypersplenism. The most prevalent kind of hypersplenism, thrombocytopenia, can result in elevated blood pressure. Thrombocytopenia can be treated with a variety of drugs for hypersplenism, such as TIP, phase embolization, splenectomy, and segment splenectomy. Usually, bleeding is followed by hypersplenism. Thrombopoietin and other cytokine therapies may give promise for the future[14]. Individuals who suffer from liver illness also have heart problems. The fact that the liver produces the majority of fatty acids and fatty proteins is not unexpected. Liver artery thrombosis, which has a number of adverse symptoms, can result from joint obstruction or congenital defects. Determining the growing number of medications accessible is crucial to comprehending the causes underlying thrombosis and its progression. These consist of anticoagulants, sedatives, and novel medications such recombinant factor VI Ia. In humans, haemorrhoids are the most prevalent neurological conditions. Fractures frequently result in death. These aneurysms are frequently seen in individuals who need treatment either before to or after liver surgery[15].

The study's main emphasis was Pakistan, where the prevalence of viral hepatitis in people of all ages and throughout the country was assessed using the data that was already available. Furthermore, the risk factors as well as the current preventive and board approaches in Pakistan were assessed. Rising countries are more likely to have disorders linked to orofecal microbes, the survey found.

Similarly, 90% of children in Pakistan get infected with hepatitis A before they are 10 due to inadequate antiseptic conditions plus a lack of sanitary facilities[16]. 50–60% cases of severe viral hepatitis in Pakistani children are caused by an infection[17]. Furthermore, up to 100% of kids tested positive for HAV IgG by the age of 14, indicating that a significant number of people are exposed to the sickness while they are young.

Comparing adults to children, it has been shown that 5.4 to 6.1% of adults had severe hepatitis caused by HAV. The Pakistan Field Epidemiology and Laboratory Training Initiative (FELTP), in partnership with the Ministry of Health and the CDC's Division of Viral Hepatitis, developed a hepatitis sentinel reconnaissance structure in 2009. There were five public tertiary consideration medical clinics in the framework. Men had greater rates of HEV and HAV (69.5% and 72.4%, respectively). Hepatitis When age was taken into account, the age group of 20 to 29 years old had the highest frequency of HAV (41.2%), followed by those aged 30 to 39 (16.3%) and those aged 6 to 19 (12.8%). To focus on infectious hepatitis in Pakistan, the study looked at the data available to determine the prevalence of viral hepatitis in populations of all ages across the country. It then evaluated the risk factors and preventive and board methods currently in use in Pakistan, despite the fact that HEV is thought to be responsible for 30.4, 22.9, and 18.8% of cases in the age group of 20. The paper states that orofecal pathogen infections are more common in developing countries. In Pakistan, hepatitis A, which first appears around age 10, affects 90% of children. This is usually caused by a lack of sanitary practices and insufficient sterile conditions. Hepatitis A infection is the source of 50–60% of pediatric cases of severe viral hepatitis in Pakistan[18]. The fact that up to 100% of children tested positive for HAV IgG by the age of 14 further suggests that a sizable percentage of the population is exposed to the disease throughout their early years. At ages 29, 30, 39, and 40–49, jaundice was seen in 43.7% of HEV patient’s vs to 28.4% of HAV patients.

Genetic identification and the illustration of a cunning infection associated with human hepatitis E infection from hens with hbv-splenomegaly disease were the main topics of discussion in the United States. An ingenious infection associated with human hepatitis E virus (HEV) is depicted and the hereditary distinguishing evidence is explained by the bile tests of chickens with HS illness. The infection has probably been called avian HEV to differentiate it from pig and human HEV due to its major grouping characteristic and comparative genetic link with HEV. Bird HEV is a non-wrapped infectious molecule that is 30–35 nm wide, according to electron microscopy.

According to estimates from CT imaging, the spleen weakens similarly to the liver. In addition to the diagnosis of splenomegaly (a splenic estimation of more prominent than 10 cm in craniocaudal length), splenic sore, mass sores, vascular irregularities, growths, provocative changes, horrendous injury, intra-stomach lymphadenopathy, or liver irregularities with stomach CT, other tests may be performed,

including MRI, PET sweeps, liver-spleen colloid examination, splenectomy, and splenic biopsy. For spleen estimate, ultrasound is a helpful imaging method that lowers patient radiation from CT imaging. It is less costly than most other imaging methods, generally accessible, and simple to use. The normal ultrasound-estimated spleen size is less than 13 cm larger than the subpar pivot, 6 to 7 cm on average for the horizontal hub, and 5 to 6 cm on average for the back plane[19]. Ultrasound is a critical diagnostic technique for splenomegaly in individuals with acute hepatitis who do not show indications of portal hypertension. Its non-invasive nature, ubiquitous availability, and low cost make it an excellent modality for real-time abdominal organ evaluation. The spleen may grow as a result of increased immunological activity or systemic inflammation in acute hepatitis cases. Ultrasound allows for reliable assessment of spleen size, which aids in making a determination of splenomegaly. Furthermore, it helps doctors distinguish between splenomegaly caused by acute hepatitis and that caused by hypertension at the portal by assessing other factors such as portal vein diameter and flow patterns. Serial ultrasonography exams can track changes in spleen size over time, offering insight into illness progression or remission, which is especially beneficial in managing acute hepatitis patients. Furthermore, the presence of splenomegaly on ultrasonography may necessitate further diagnostic examinations to rule out other underlying reasons, guaranteeing thorough patient management. Thus, ultrasonography is an important tool in the diagnosis and treatment of spleen swelling in acute hepatitis patients who do not have portal hypertension.

The damage to the liver in severe hepatitis and the compulsive effects of the illness on the spleen are both evaluated by this investigation. The review helps to identify the prevalence of splenomegaly in patients with severe hepatitis and the comorbidities in these individuals in order to identify all curable reasons that are often linked to hepatitis and splenomegaly. The ideal approach is ultrasound since it provides excellent depiction and intricacies of splenic architecture and has no adverse reactions, making it safe for all patients, including kids and pregnant women[20]. Splenomegaly occurs when the spleen enlarges or grows heavier; medical professionals define splenomegaly as when the spleen weighs more than 400 grams (0.88 pounds) and measures 12 to 20 centimetres (4.7 to 7.9 inches) in length. Many diseases can cause the spleen to enlarge, especially those that cause platelets to split too quickly. For example, an excess of platelets can deplete the spleen and cause it to enlarge. Other conditions that can cause the spleen to enlarge include bacterial, viral, and parasitic infections[21].

The liver, a large, essential organ located in the upper right quadrant of the midsection, is irritated by a variety of aggressive infections, including viral hepatitis. Hepatitis An and E infections often result in only severe, or present-moment, illnesses. When the illness is severe, your body can fight off the infection and it goes away. Developing countries are more vulnerable to orofecal microorganism-related diseases. For example, in Pakistan, 90% of children are infected with hepatitis A before they turn ten due to unsanitary conditions and a lack of sterile procedures. Hepatitis A Virus Infection accounts for 50–60% of cases of severe viral hepatitis in Pakistan's paediatric population, and by the age of 14, up to 100% of children tested positive for HAV IgG, indicating that the majority are exposed to the disease while they are young. A total of 14–26% of the clearly healthy children were thought to have been exposed to hepatitis E9. Due to HEV, up to 20–22% of adults and 2.4% of children were found to have severe encephalopathy and splenomegaly[22].

The reason affects which aspect of concealed splenic amplification is present. Extensive irreversible disease increases the number of reticuloendothelial cells stored in the spleen and increases the amount of effort the spleen conducts in delivering antibodies and eliminating antigens. Splenic hyperplasia may arise from these increased resistive capacities, and splenic expansion (infiltrative splenomegaly) may be brought on by extramedullary hemopoiesis.

In any event, a person with splenomegaly associated with a disease may have a variety of side symptoms, such as fever, a general feeling of being discomfort, and shaking. Three members of the general population have splenomegaly[23]. Ultrasound is a widely available, noninvasive, and useful means of diagnosing splenic abnormalities. A combination of ultrasonic characteristics and clinical data may provide an accurate diagnosis. If the US appearance alone is not enough, US may also be used to guide biopsy of suspicious lesions[24].A combination of imaging evaluation and serum tests may definitively assess splenomegaly and the underlying cause of insanity in the total platelet counts and morphology, including WBC, RBC, and platelets, which will vary depending on the fundamental state of sickness. Imaging is frequently used to examine splenomegaly and determine its underlying cause[25]. In Taiwan, splenomegaly on ultrasound is used to help diagnose liver cirrhosis in hepatitis B patients for lifelong antiviral treatment. This study checked if splenomegaly is a reliable sign of cirrhosis and found its accuracy to be moderate. It concluded that splenomegaly alone is not a good noninvasive tool for diagnosing liver cirrhosis in these patients[26].

METHODOLOGY:

In Superior University in Lahore, we conducted descriptive cross-sectional research from May 2024 to February 2025, to be Sonographic evaluation of splenomegaly in individuals with acute hepatitis who did not show symptoms of portal hypertension was the main focus of the investigation. The study recruited 133 hepatitis patients with splenic enlargement but no signs of portal hypertension, using a non-probability sampling approach. The inclusion criteria for this study consisted of patients diagnosed with acute hepatitis, confirmed through clinical symptoms, laboratory findings, and liver function tests. Eligible participants were individuals aged 18 years and above who had undergone abdominal ultrasound as part of their diagnostic evaluation. Only patients without any clinical, laboratory, or sonographic evidence of portal hypertension—such as splenic or portal vein dilation, ascites, or varices—were included. Additionally, participation required informed consent from each patient.

Patients were excluded if they had chronic hepatitis or any other chronic liver disease, including cirrhosis or autoimmune hepatitis. Those with clinical or sonographic signs of portal

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hypertension were also excluded. Other exclusion criteria included the presence of haematological disorders such as lymphoma, leukaemia, or haemolytic anaemias, recent trauma, malignancies, or infections like malaria, typhoid, or mononucleosis that are known to cause splenic enlargement. Pregnant women were excluded due to physiological changes that could affect ultrasound interpretation. Furthermore, any patients with incomplete clinical or imaging records were not considered for inclusion in the study. For data analysis SPSS 25 version was used. Descriptive statistics, chi-square tests, and possibly t-tests/ANOVA were utilised depending on the data.

Ultrasound examination by a specialist may reveal an error or exacerbation of splenomegaly with acute hepatitis. If there isn't indication for portal hypertension, Thoughtfulness should be exercised on the basis of a sonographic explanation of the diagnosis of splenomegaly. In people with liver problems, splenomegaly is commonly seen. Patients who are affected may have pain, discomfort, or a fullness sensation in the upper left abdomen that may radiate to the left shoulder, as well as trouble eating large meals. Reduced red blood cell counts are frequently associated with this disease. Hepatitis, which is characterized as inflammation of the liver, can be brought on by drinking alcohol, having certain illnesses, or using certain drugs. Viral infections continue to be the most frequent cause of hepatitis, nevertheless.

RESULTS:

With no portal hypertension, we treat 133 individuals with acute hepatitis. 102 individuals (77%) had enlarged spleens, whereas 31 people (23%) had normal spleens. We determined that the main risk factor for hepatitis identified by ultrasonography is splenomegaly. Table Showing spleen size in Hepatitis A, Hepatitis B, Hepatitis C and Hepatitis D.

Table 1: Frequency Distribution of Types of Hepatitis

Spleen Size (cm)	12	13	14	15	16	17	18	19	20	21	Total
Hepatitis A	8	6	1	0	0	0	0	0	2	0	17
Hepatitis B	1	15	14	10	6	0	1	1	4	0	52
Hepatitis C	0	1	4	0	1	3	15	16	22	1	63
Hepatitis D	0	0	0	0	1	0	0	0	0	0	1
Total	9	22	19	10	8	3	16	17	28	1	133

In our study of 133 patients with acute hepatitis, hepatitis C was the most prevalent, diagnosed in 63 patients (47.4%, 95% CI: 38.9%–55.9%). Hepatitis B and D were present in 53 patients (39.8%, 95% CI: 31.6%–48.3%), while hepatitis A was observed in 17 patients (12.8%, 95% CI: 7.6%–19.6%).

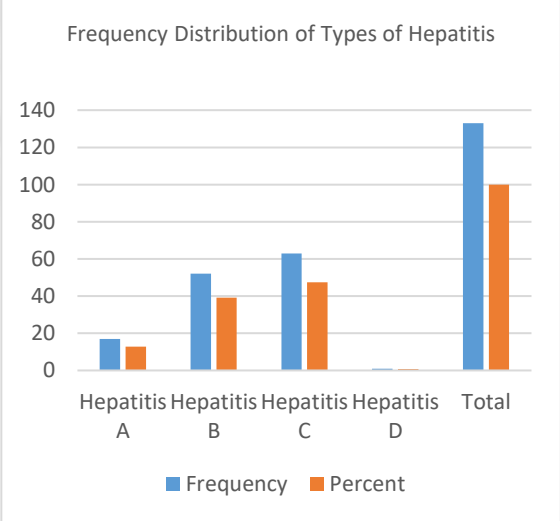
Image Below showing enlarged spleen measuring 15.5cm in transverse diameter and 5.7cm in longitudinal diameter.

Among all patients, 31 (23.3%, 95% CI: 16.3%–31.6%) showed no splenomegaly on ultrasound. Splenomegaly was identified in only 4 patients (3.0%, 95% CI: 0.8%–7.5%) among those with hepatitis A and D. It was more common in patients with hepatitis B, found in 36 patients (27.1%, 95% CI: 19.5%–35.9%), and most frequent in hepatitis C cases, affecting 62 patients (46.6%, 95% CI: 38.1%–55.2%).

Table 2: Frequency Distribution of Types of Hepatitis

	Frequency	Percent
Hepatitis A	17	12.8
Hepatitis B	52	39.1
Hepatitis C	63	47.4
Hepatitis D	1	.8
Total	133	100.0

Frequency Distribution of Types of Hepatitis. The high level of frequency in selected population or patients is Hepatitis C.



Graph 1: Correlation of Spleen size in hepatitis.

Graph shows spleen size in cm and show types of hepatitis such as A, B, C and D.

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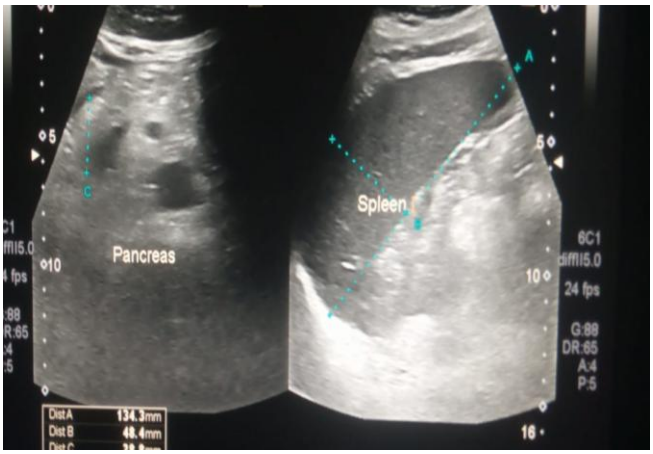

Image showing splenomegaly in patient in which portal hypertension was absent.

DISCUSSION:

Ultrasound examination is a diagnostic procedure that uses high-frequency sound waves to take live pictures of interior organs. The transducer probe, which sends out sound waves and collects the echoes that return, is the main part of the ultrasound machine. Abdominal organs are especially examined with a transabdominal ultrasound. The ultrasonography transducer is pushed to the abdominal skin during the operation. A computer processes the high-frequency sound waves that the transducer emits after they bounce off inside tissues to create a picture called an abdominal ultrasound or sonogram.

We want to know how well ultrasonography (USG) can identify splenomegaly in hepatitis patients. The identification of splenomegaly in hospitalized patients is improved by point-of-care ultrasonography, according a research by Andrew P.J. and Bernard (2020). Among the 39 participants in their study, splenomegaly was found in 12.5% (5 people). The physical examination yielded an 88% (95% CI: 74–95%) specificity and a 40% (95% CI: 12–77%) sensitivity for splenomegaly detection.

Additionally, point-of-care ultrasonography greatly enhances physicians' capacity to identify splenomegaly, according to Olson et al. (2015). Of the 70 patients we assessed for our study, 52.8% were men and 43.1% were women. Hepatitis-related splenomegaly was seen in 80% of these patients, whereas none at all in 18.3%. Our analysis suggests that splenomegaly, a major risk factor for hepatitis, frequently develops in people with the illness. In a recent study, aberrant ultrasound findings—specifically, characteristics diagnostic of cirrhosis, such as surface nodularity—were successfully utilized to establish a cirrhosis diagnosis in participants who did not exhibit clinical indications of portal hypertension. In 68% of instances, there was a favorable correlation between this data or the results of liver biopsies.

It is commonly known that ultrasonography may not be very sensitive in identifying cirrhosis on its own, especially when there are no obvious clinical signs present. However, its diagnostic utility is still up for discussion. The liver biopsy showed either no fibrosis (F0) or just mild fibrosis (F1/F2) in 20% of the instances when the ultrasonography indicated no cirrhosis. This study, predictably, found no significant correlation between advanced liver disease and portal vein enlargement in individuals who did not exhibit obvious signs of portal hypertension.

Results from earlier studies assessing Doppler ultrasound's diagnostic accuracy for liver illness have been mixed. The present investigation found that liver disease was modestly related with aberrant serological markers, including increased thrombocytopenia, FIB-4 levels, and APRI scores. The exclusion of patients with proven portal hypertension, including those with splenomegaly, from the ultrasound assessment, however, could have a result on this. Excluding hypertensive patients may lower diagnostic sensitivity since APRI and FIB-4 scores rely significantly on platelet counts, which could be having an impact on the clinical and nutritional health of the chosen people.

Liver biopsies still have significant limitations, despite being the gold standard for fibrosis staging and diagnosis. The accuracy of fibrosis evaluation and staging can be impacted by variables such missing portal tracts, fragmented or short biopsy specimens, and sampling error. The inclusion of both F3 and F4 patients in this trial improved ultrasound's diagnostic usefulness in identifying advanced fibrosis, with results from liver biopsies showing an improvement of more than 10%. Some people who were categorized as F3 would still be at risk of developing cirrhosis since they had biopsy samples that weren't as good.

According to prior studies, both disease dynamics and fibrosis reductions may have an impact on the course of liver cirrhosis. This involves taking into account radiological data, diagnostic thresholds, and the objective of assessing the sensitivity of ultrasonography.

To more precisely detect structural liver alterations, it is also critical to use contemporary ultrasound techniques in conjunction with existing literature and new technology developments. When describing hepatic changes, this involves using words like "nodular" or "cirrhotic" with caution and avoiding misclassifications or inconsistent interpretations, especially when chronic hepatitis or poorly defined liver damage is involved.

Every participating doctor who performed abdominal ultrasonography for this research had prior liver imaging experience. But there were no official tests or measurements of any particular cirrhosis symptoms or indicators. The small sample size hampered statistical power and precluded multivariate analysis, including the assessment of ultrasound's predictive value for cirrhosis or associated clinical symptoms, even if a reader-based analysis may have provided a little more information if needed.

Diagnostic accuracy and generalizability were limited by the study's minimum sample size of 69 individuals. Additionally, transient elastography, which might be used as an alternative fibrosis marker and allow for better comparison between the ultrasound and biopsy, was only used to assess fibrosis in a limited subgroup (n = 6). Notwithstanding these drawbacks, the study is nonetheless pertinent, particularly in light of the fact that not all doctors have access to elastography. Cryoglobulin and caudate lobe hypertrophy data, which may have offered further information on the course of liver illness, were also not gathered.

CONCLUSION:

It is crucial to take into account the substantial consequences of splenic enlargement seen by ultrasonography in individuals suffering from acute hepatitis. Of the 133 patients in our research who had acute hepatitis without portal hypertension, 23% had normal spleen size and 77% had splenomegaly.

Our findings indicate that splenomegaly is a major risk factor associated with hepatitis, and ultrasound serves as a highly sensitive and reliable imaging modality for diagnosing spleen enlargement in this patient population. Early detection of splenic enlargement in acute hepatitis patients can facilitate timely intervention, potentially preventing progression to chronic liver disease and thereby reducing the global mortality associated with liver complication.

For clinical practice, routine ultrasound evaluation of the spleen should be incorporated into the diagnostic workup of patients with acute hepatitis, even in the absence of portal hypertension. Recognizing splenomegaly early allows healthcare providers to identify patients at higher risk of disease progression, enabling closer monitoring, more aggressive management, and potentially improved outcomes. Moreover, ultrasound being a non-invasive and widely available technique makes it a practical tool for widespread screening.

Future studies should focus on longitudinal follow-up of patients with splenomegaly in acute hepatitis to better understand its role in the progression to chronic liver disease. Research could also explore the underlying pathophysiological mechanisms linking splenomegaly and liver injury without portal hypertension. Additionally, investigations into whether early therapeutic interventions targeting splenic enlargement could improve clinical outcomes would be valuable. Finally, large multicentre trials could validate the predictive value of ultrasound-detected splenomegaly and refine risk stratification models in hepatitis patients.

CONFLICT OF INTEREST:

There was no conflict of interest between all the authors of the article.

REFERENCES:

1. Mahadevan V. Anatomy of the pancreas and spleen. Surgery (Oxford). 2019 Jun 1;37(6):297-301.
2. McKenzie CV, Colonne CK, Yeo JH, FraserST.Splenomegaly:pathophysiological bases and therapeutic options. Int J Biochem Cell Biol. 2018 Jan 1;94:40-3.
3. Chen MJ, Huang MJ, Chang WH, Wang TE, Wang HY, Chu CH, et al. Ultrasonography of splenic abnormalities. World J Gastroenterol. 2005 Jul 14;11(26):4061-6. doi: 10.3748/wjg.v11.i26.4061.
4. Pozo AL, Godfrey EM, Bowles KM. Splenomegaly: investigation, diagnosis and management. Blood Rev. 2009 May;23(3):105-11.
5. O'Donohue J, Ng C, Catnach S, Farrant P, Williams R. Diagnostic value of Doppler assessment of the hepatic and portal vessels and ultrasound of the spleen in liver disease. Eur J Gastroenterol Hepatol. 2004 Feb;16(2):147-55. doi: 10.1097/00042737-200402000-00005.
6. Andrews MW. Ultrasound of the spleen. World J Surg. 2000 Feb;24(2):183-7. doi: 10.1007/s002689910031.
7. Faller DV. Diseases of the spleen. In: Wyngaarden JR, Smith LH, editors. Cecil Textbook of Medicine. 18th ed. Philadelphia: Saunders; 1988. p. 1036.
8. Bolognesi M, Merkel C, Sacerdoti D, Nava V, Gatta A. Role of spleen enlargement in cirrhosis with portal hypertension. Dig Liver Dis. 2002 Feb;34(2):144-50.
9. Kardel T, Holm HH, Rasmussen SN, Mortensen T. Ultrasonic determination of liver and spleen volumes. Scand J Clin Lab Invest. 1971;27(2):123-6.
10. Rasmussen SN, Christensen BE, Holm HH, Kardel T, Stigsby B,Larsen M. Spleen volume determination by ultrasonic scanning. Scand J Haematol. 1973;10(4):298-303.
11. Koga T, Morikawa Y. Ultrasonographic determination of the splenic size and its clinical usefulness in various liver diseases. Radiology. 1975 Apr;115(1):157-61.
12. Asai H. Ultrasonotomographic studies on determination of splenomegaly in chronic liver diseases and diagnosis of extrahepatic obstructive jaundice. J Osaka City Med Assoc. 1977;26:487-95.
13. Niederau C, Sonnenberg A, Muller JE, Erckenbrecht JF, Scholten T, Fritsch WP. Sonographic measurements of the normal liver, spleen, pancreas, and portal vein. Radiology. 1983 Dec;149(2):537-40.
14. Abdi W, Millan JC, Mezey E. Sampling variability on percutaneous liver biopsy. Arch Intern Med. 2012;139(6):667-9.
15. Asghar A, Agrawal D, Yunus SM, Sharma PK, Zaidi SHH, Sinha A. Standard splenic volume estimation in North Indian adult population: using 3D reconstruction of abdominal CT scan images. Anat Res Int. 2011;2011:707325. doi: 10.1155/2011/707325.
16. Afdhal NH, Bacon BR, Patel K, et al. Accuracy of fibroscan, compared with histology, in analysis of liver fibrosis in patients with hepatitis B or C: a United States multicenter study. Clin Gastroenterol Hepatol. 2015 Apr;13(4):772-9.e1-3.
17. Yokoyama A, Yokoyama T, Mizukami T, Matsui T, Kimura M, Matsushita S, et al. Platelet counts and genetic polymorphisms of alcohol dehydrogenase-1B and aldehyde dehydrogenase-2 in Japanese alcoholic men. Alcohol Clin Exp Res. 2016 Jan;41(1):171-8. doi: 10.1111/acer.13283.
18. Khashper A, Shwartz D, Taragin BH, Shalmon T. Splenic size as a marker for active inflammation in Crohn's disease. Clin Imaging. 2022 Apr;84:164-7. doi: 10.1016/j.clinimag.2022.02.012.
19. Safak AA, Simsek E, Bahcebasi T. Sonographic assessment of the normal limits and percentile curves of liver, spleen, and kidney dimensions in healthy school-aged children. J Ultrasound Med. 2005 Oct;24(10):1359-64. doi: 10.7863/jum.2005.24.10.1359.
20. Barr RG, Ferraioli G, Palmeri ML, et al. Elastography assessment of liver fibrosis: Society of Radiologists in Ultrasound consensus conference statement. Radiology. 2015 Sep;276(3):845-61.
21. Berzigotti A, Castera L. Update on ultrasound imaging of liver fibrosis. J Hepatol. 2013 Jul;59(1):180-2.
22. Berzigotti A, Piscaglia F. Ultrasound in portal

hypertension—part 2—and EFSUMB recommendations for the performance and reporting of ultrasound examinations in portal hypertension. Ultraschall Med. 2012 Feb;33(1):8-32.

23. Dong BT, Huang S, Lyu GR, Qin R, Gu JH. Assessment of liver fibrosis with liver and spleen stiffness measured by sound touch elastography, serum fibrosis markers in patients with chronic hepatitis B. J Dig Dis. 2021 Jun;22(6):342-50. doi: 10.1111/1751-2980.12991.
24. Chen MJ, Huang MJ, Chang WH, Wang TE, Wang HY, Chu CH, et al. Ultrasonography of splenic abnormalities. World J Gastroenterol. 2005 Jul 14;11(26):4061.
25. Cacciottolo TM, Kumar A, Godfrey EM, Davies SE, Allison M. Spleen size does not correlate with histological stage of liver disease in people with nonalcoholic fatty liver disease. Clin Gastroenterol Hepatol. 2022 Jan 13. doi: 10.1016/j.cgh.2021.12.038. Epub ahead of print.
26. Tung WL, Yang CH, Tseng PL, Hung CH, Wang JH, Chen CH, et al. Revisiting the accuracy of splenomegaly by sonography in patients with chronic hepatitis B. Adv Dig Med. 2020 Mar;7(1):30-5

CONFLICT OF INTEREST

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DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request

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